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Dual Comparator

FEATURES

- *Guaranteed* Maximum 0.5mV Input Offset Voltage
- Input Protection Diodes
- Operates From Single 5V Supply
- 25mA Drive Capability
- 80ns Response Time

APPLICATIONS

- Window Detectors
- High Speed One Shot
- Relay/Lamp Drivers
- Voltage Controlled Oscillators

DESCRIPTION

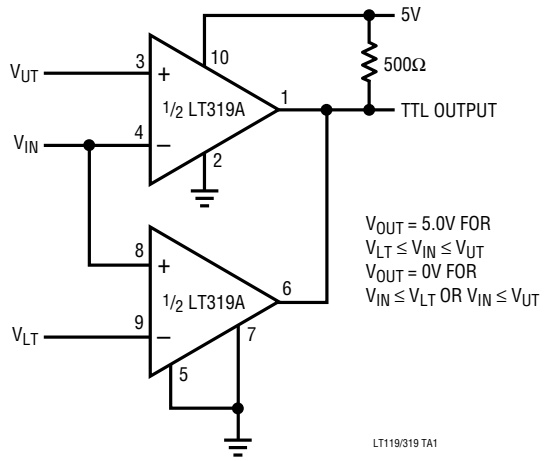
The LT119A is an improved version of the LM119 dual comparator. It features lower input offset voltage and offset current, higher voltage gain, guaranteed common mode rejection, and input protection diodes.

The LT119A is capable of operation over a supply range from 5V to ±15V and can drive 25mA loads from each open collector output. A separate ground pin allows the LT119A to isolate system grounds.

Linear Technology Corporation's advanced processing, design techniques and reliability make the LT119A/LT319A an ideal choice over previous devices in most comparator applications.

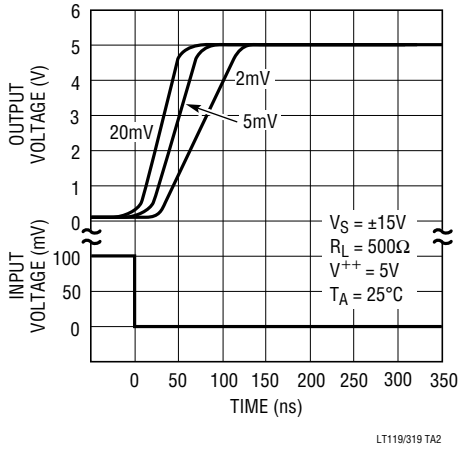
TYPICAL APPLICATION

Window Detector*



*ALLOWED WINDOW FOR SINGLE +5V SUPPLY IS 1.2V TO 3.8V

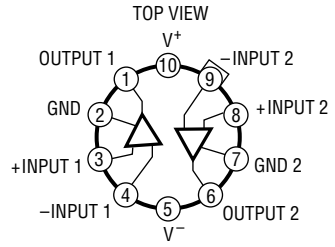
Response Time for Various Input Overdrives



ABSOLUTE MAXIMUM RATINGS

Supply Voltage 36V
Output to Negative Supply Voltage 36V
Ground to Negative Supply Voltage 25V
Ground to Positive Supply Voltage 18V
Differential Input Voltage (Note 5) ..... ±5V
Differential Input Current (Note 5) .....±5mA
Input Voltage (Note 1)
Output Short-Circuit Duration 10s
Operating Temperature Range
LT119A, LM119..... –55°C to 125°C
LT319A, LM319..... 0°C to 70°C
Storage Temperature Range ..... –65°C to 150°C
Lead Temperature (Soldering, 10 sec)..... 300°C

PACKAGE/ORDER INFORMATION

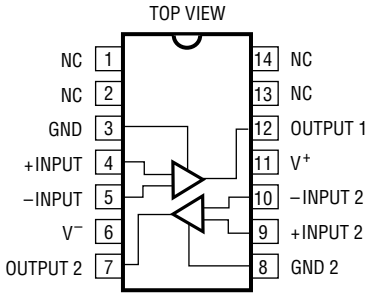


H PACKAGE
10-LEAD TO-5 METAL CAN

T_{JMAX} = 150°C, θ_{JA} = 150°C/W, θ_{JC} = 45°C/W

ORDER PART NUMBER

LT119AH
LM119H
LT319AH
LM319H



J PACKAGE
14-LEAD CERAMIC DIP

N PACKAGE
14-LEAD PLASTIC DIP

T_{JMAX} = 150°C, θ_{JA} = 100°C/W (J)
T_{JMAX} = 85°C, θ_{JA} = 100°C/W (N)

LT119AJ
LM119J
LT319AJ
LM319J
LT319AN
LM319N

Consult factory for Industrial and Military grade parts.

ELECTRICAL CHARACTERISTICS (Note 2)

SYMBOL	PARAMETER	CONDITIONS		LT119A MIN	LT119A TYP	LT119A MAX	LT119 MIN	LT119 TYP	LT119 MAX	UNITS
V_{OS}	Input Offset Voltage	V_S = ±15V, V_{CM} = 0			0.3	0.5			4	mV
V_{OS}	Input Offset Voltage	(Note 3)			0.5	1.0		0.7	4	mV
			●		1.2	2.0			7	mV
CMRR	Common-Mode Rejection Ratio			90	106					dB
I_{OS}	Input Offset Current	(Note 3)			20	40		30	75	nA
			●			75			100	nA
I_B	Input Bias Current	(Note 3)			150	500		150	500	nA
			●			1000			1000	nA
A_V	Voltage Gain			20	40		10	40		V/mV
	Response Time	(Note 4)			80			80		ns
V_{SAT}	Saturation Voltage	$V_{IN} \le -5mV$, I_O = 25mA $V^+ \ge 4.5V$, $V^- = 0V$			0.75	1.5		0.75	1.5	V
		$V_{IN} \le -6mA$, $I_{SINK} \le 3.2mA$								
		$T_A \ge 0°C$			0.23	0.4		0.23	0.4	V
		$T_A \le 0°C$				0.6			0.6	V
	Output Leakage Current	$V_{IN} \ge 5mV$, V_{OUT} = 35V			0.2	2		0.2	2	µA
			●		1	10		1	10	µA
	Input Voltage Range	V_S = ±15V	●	–12	±13	12	–12	±13	12	V
		V^+ = 5V, V^- = 0V	●	1		3	1		3	V

ELECTRICAL CHARACTERISTICS (Note 2)

SYMBOL	PARAMETER	CONDITIONS		LT119A MIN	LT119A TYP	LT119A MAX	LT119 MIN	LT119 TYP	LT119 MAX	UNITS
	Differential Input Voltage		●			±5			±5	V
I_S	Supply Current	$V^+ = 5V$, $V^- = 0V$			4.3			4.3		mA
I_S	Positive Supply Current	$V_S = ±15V$			8	11.5		8	11.5	mA
I_S	Negative Supply Current	$V_S = ±15V$			3	4.5		3	4.5	mA
V_{OS}	Input Offset Voltage	$V_S = ±15V$, $V_{CM} = 0V$			0.3	0.5			8	mV
V_{OS}	Input Offset Voltage	$R_S \le 5k$			0.5	1		2	8	mV
		(Note 3)	●			2			10	mV
CMRR	Common-Mode Rejection Ratio			90	106					dB
I_{OS}	Input Offset Current	(Note 3)			30	40		80	200	nA
			●			60			300	nA
I_B	Input Bias Current	(Note 3)			150	500		250	1000	nA
			●			1000			1200	nA
A_V	Voltage Gain			20	40		8	40		V/mV
	Response Time	(Note 4)			80			80		ns
V_{SAT}	Saturation Voltage	$V_{IN} \le -10mV$, $I_{SINK} = 25mA$ $T_A = 25°C$			0.75	1.5		0.75	1.5	V
		$V^+ \ge 4.5V$, $V^- = 0V$ $V_{IN} \le -10mV$, $I_{SINK} \le 3.2mA$	●		0.3	0.4		0.3	0.4	V
	Output Leakage Current	$V_{IN} \ge 10mV$, $V_{OUT} = 35V$			0.2	10		0.2	10	µA
	Input Voltage Range	$V_S = ±15V$	●		±13			±13		V
		$V^+ = 5V$, $V^- = 0V$	●	1		3	1		3	V
	Differential Input Voltage		●			±5			±5	V
I_S	Supply Current	$V^+ = 5V$, $V^- = 0V$			4.3			4.3		mA
I_S	Positive Supply Current	$V_S = ±15V$			8	12.5		8	12.5	mA
I_S	Negative Supply Current	$V_S = ±15V$			3	5		3	5	mA

The ● denotes specifications which apply over the full operating temperature range.

Note 1: For supply voltages less than ±15V, the maximum input voltage is equal to the supply voltage.

Note 2: Unless otherwise noted, supply voltage equals ±15V and $T_A = 25°C$. The ground pin is grounded. Note that the maximum voltage allowed between the ground pin and V^+ is 18V. Do not tie the ground pin to V^- when the power supply voltage exceeds ±9V. The offset voltage, offset current and bias current specifications apply for all supply voltages between ±15V and 5V unless otherwise specified.

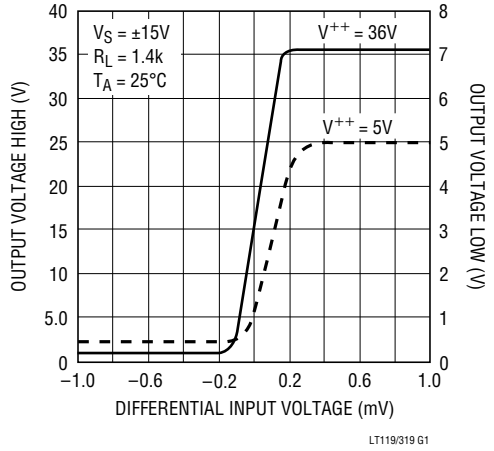
Note 3: The offset voltages and currents given are the maximum values required to drive the output within 1V of either supply with a 1mA load, thus these parameters define an error band and take into account the worst case effects of voltage gain and input impedance.

Note 4: Response time specified is for a 100mV input step with 5mV overdrive.

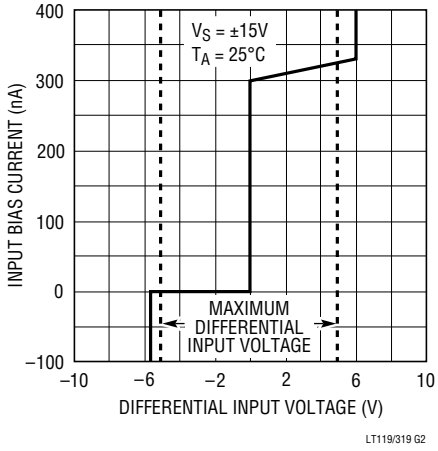
Note 5: Inputs are protected with back-to-back 5.6V zener diodes. This limits maximum differential input voltage to ±5V if current is unlimited. Larger differential input drive is allowed if input current is limited to ±5mA with external resistance.

TYPICAL PERFORMANCE CHARACTERISTICS

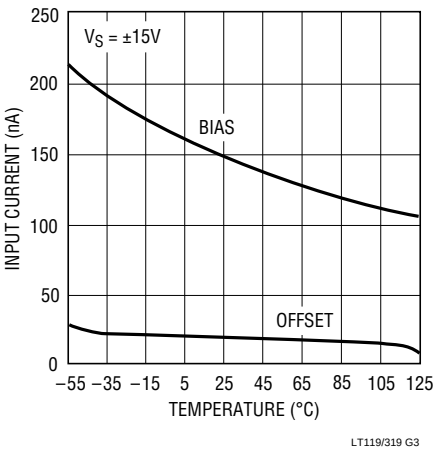
Transfer Function



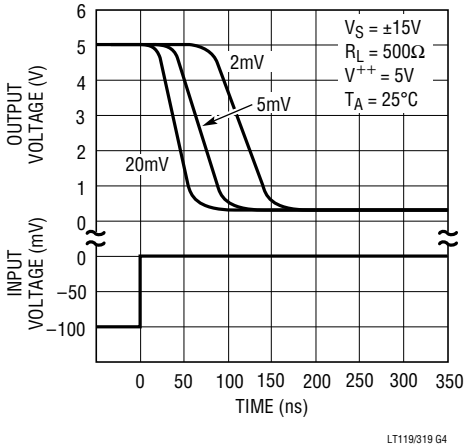
Input Characteristics



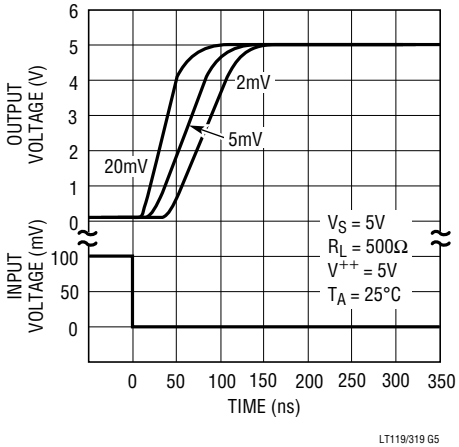
Input Currents



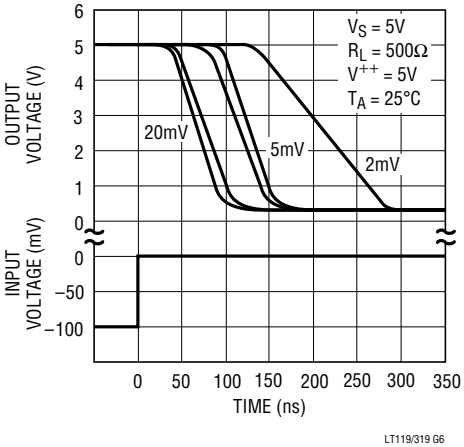
Response Time for Various Input Overdrives



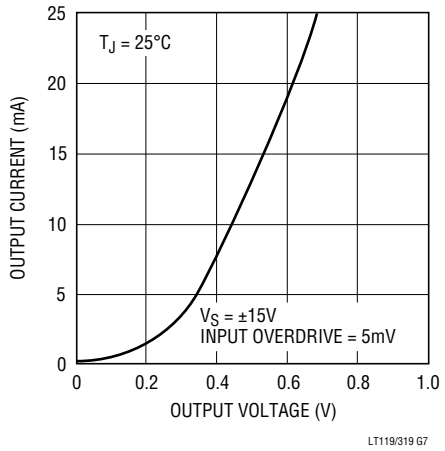
Response Time for Various Input Overdrives



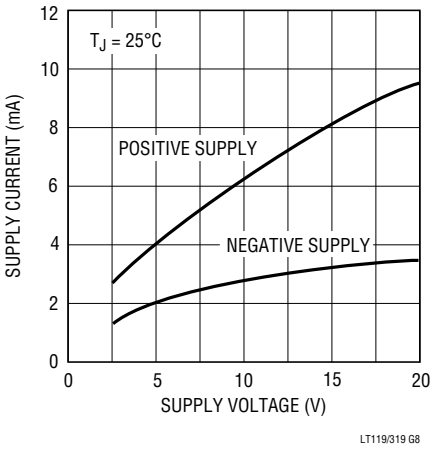
Response Time for Various Input Overdrives



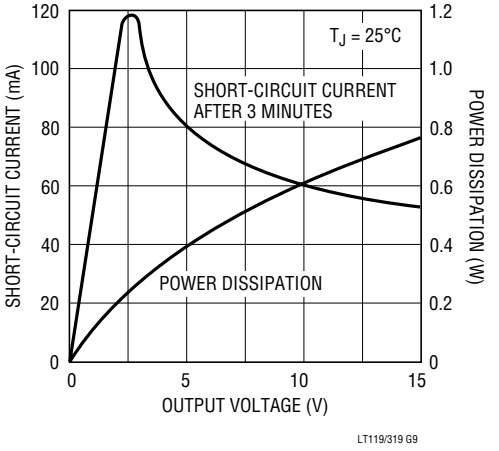
Output Saturation Voltage



Supply Current

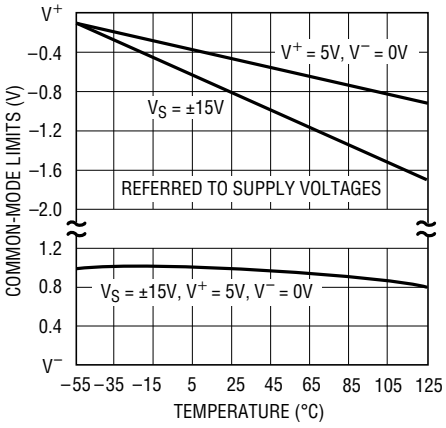


Output Limiting Characteristics



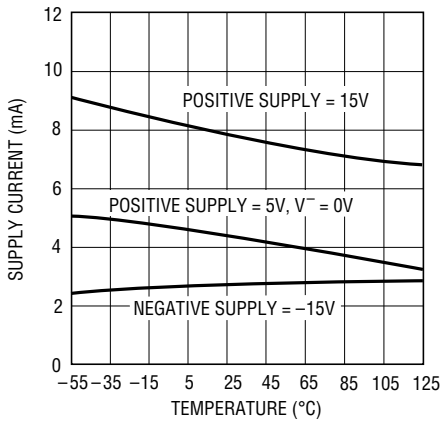
TYPICAL PERFORMANCE CHARACTERISTICS

Common-Mode Limits



LT119/319 G10

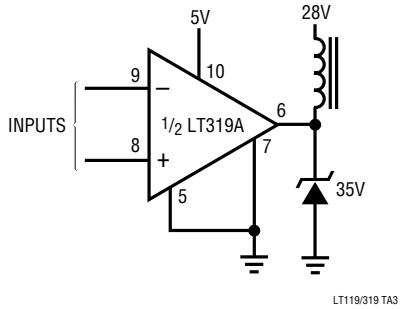
Supply Current



LT119/319 G11

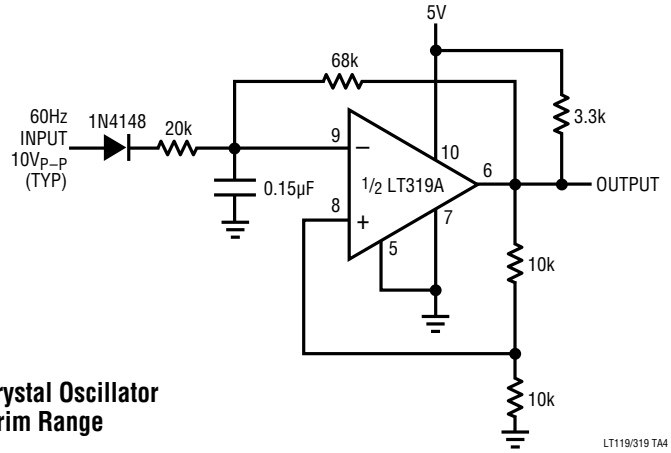
TYPICAL APPLICATIONS

Relay Driver



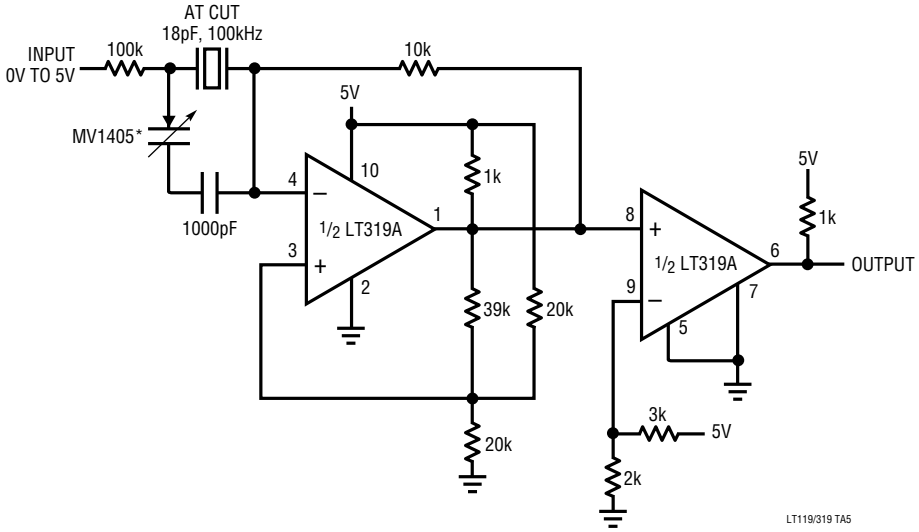
LT119/319 TA3

High Noise Immunity 60Hz Sync Circuit



LT119/319 TA4

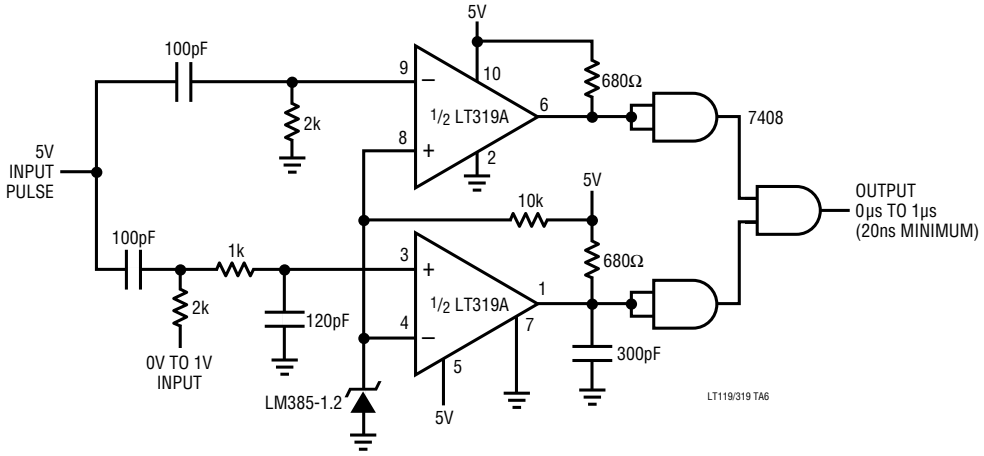
Voltage Controlled Crystal Oscillator With 100PPM Trim Range



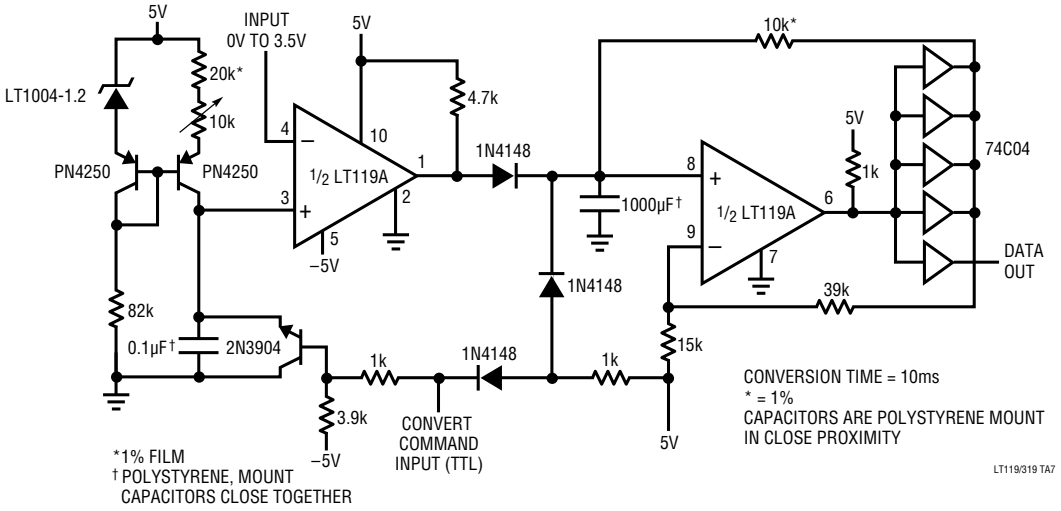
LT119/319 TA5

TYPICAL APPLICATIONS

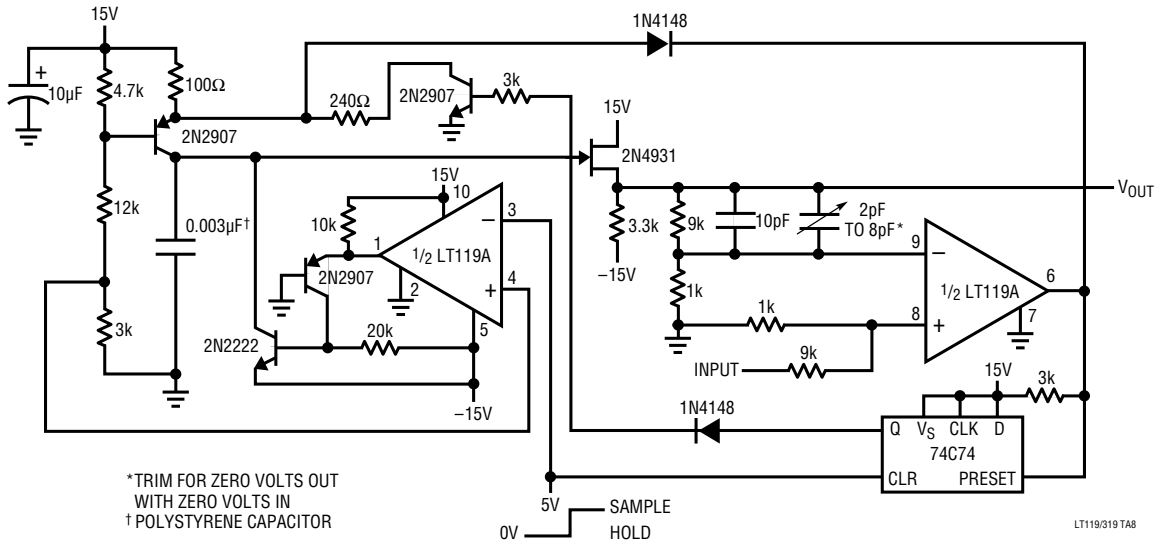
Voltage Controlled High Speed One Shot



10-Bit Serial Output A/D Converter

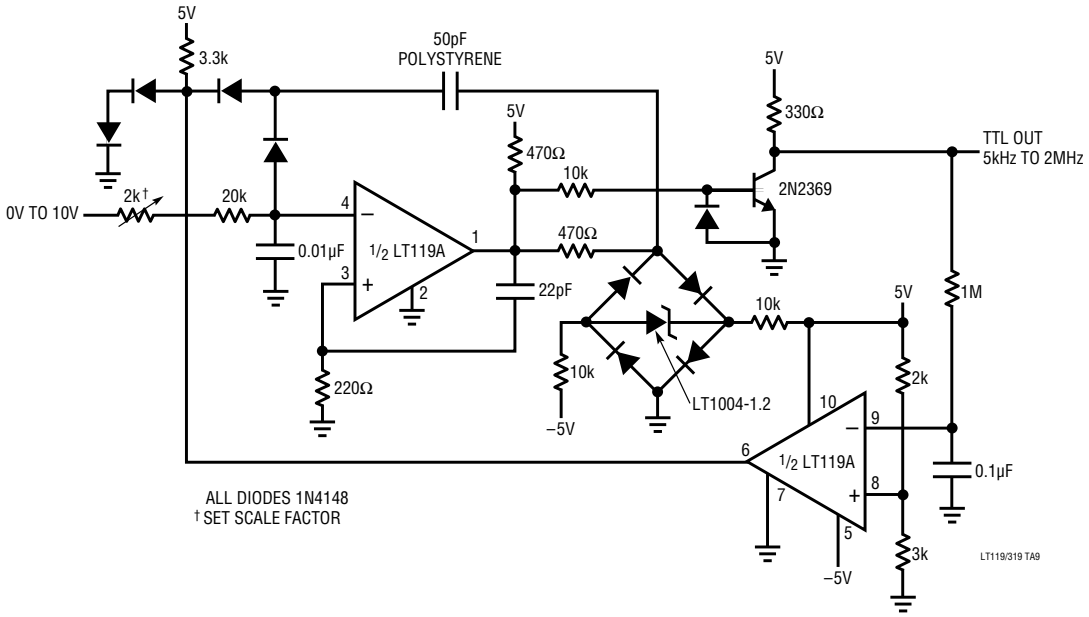


5 Microsecond Sample-and-Hold with Zero Hold Step

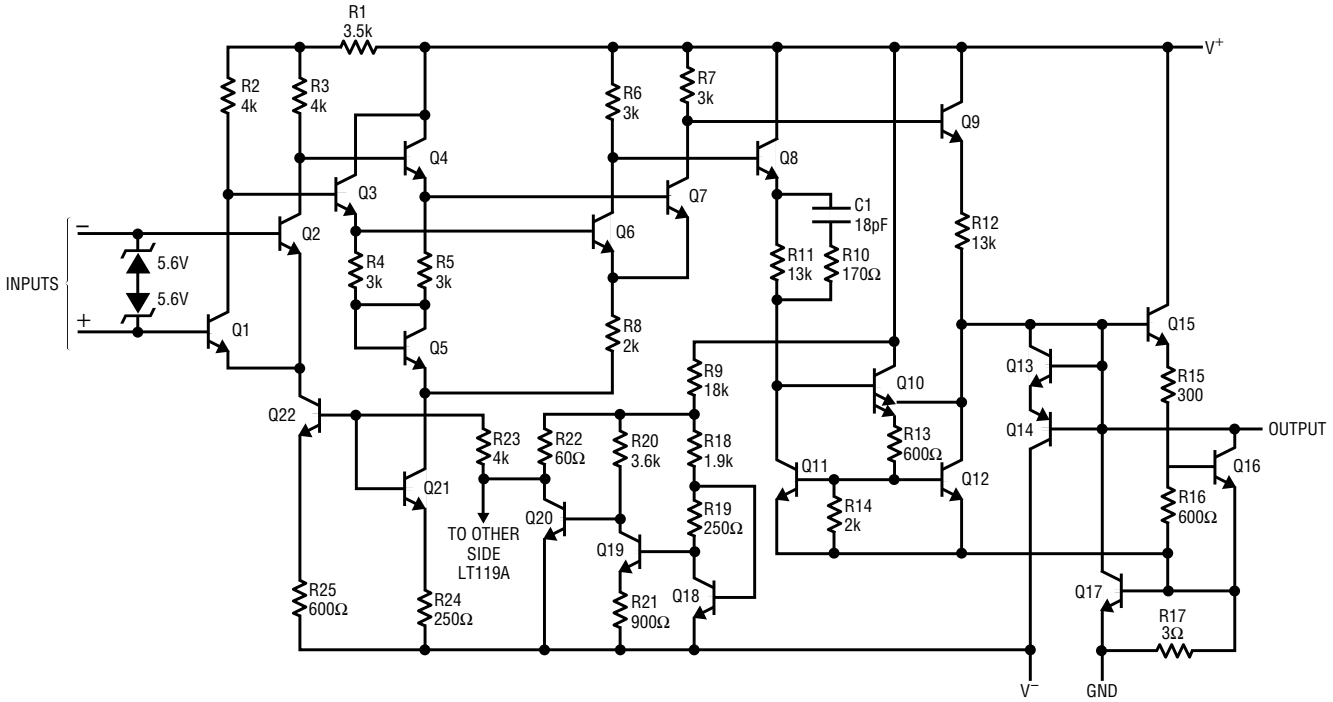


TYPICAL APPLICATIONS

5kHz to 2MHz V→F Converter



SCHEMATIC DIAGRAM

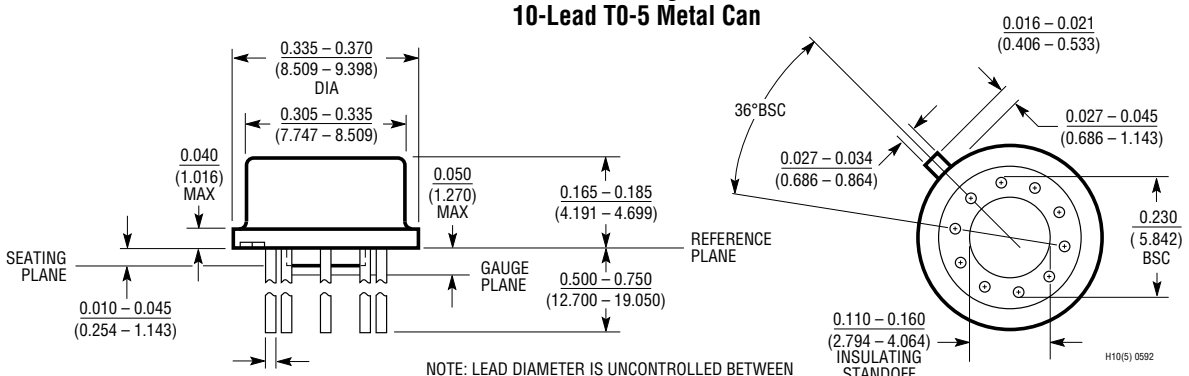


Information furnished by Linear Technology Corporation is believed to be accurate and reliable. However, no responsibility is assumed for its use. Linear Technology Corporation makes no representation that the interconnection of its circuits as described herein will not infringe on existing patent rights.

PACKAGE DESCRIPTION

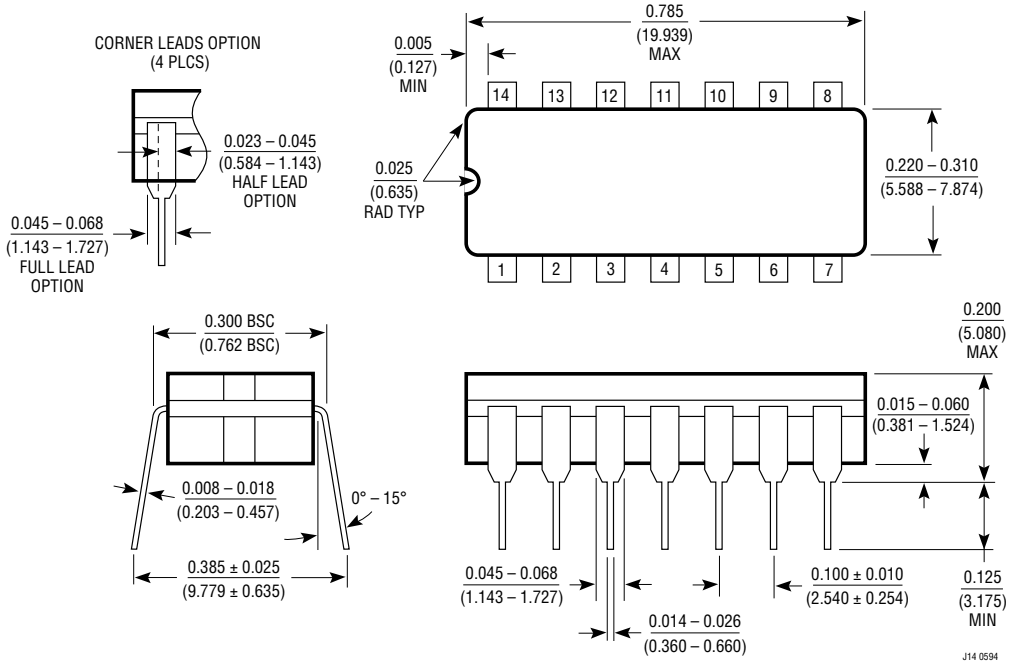
Dimension in inches (millimeters) unless otherwise noted.

H Package
10-Lead TO-5 Metal Can



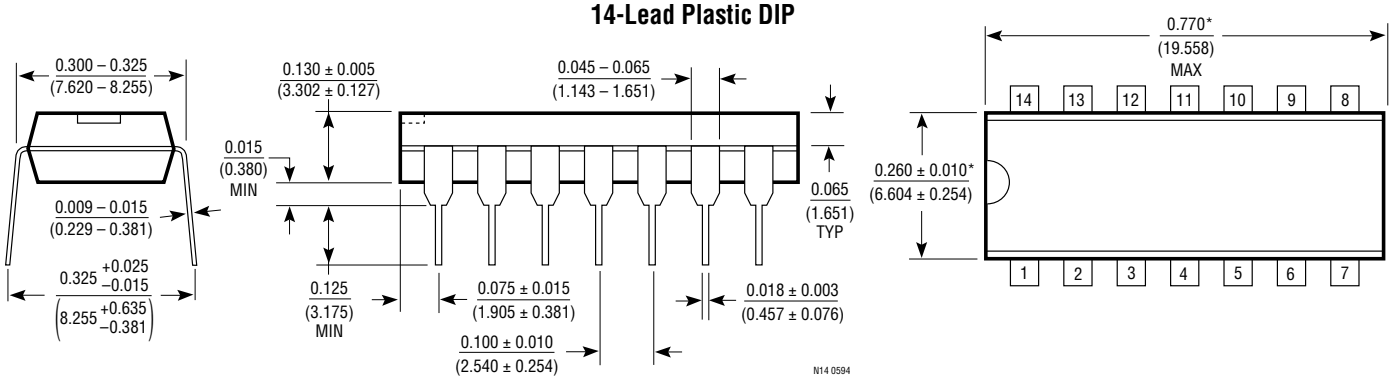
NOTE: LEAD DIAMETER IS UNCONTROLLED BETWEEN
THE REFERENCE PLANE AND SEATING PLANE.

J Package
14-Lead Ceramic DIP



NOTE: LEAD DIMENSIONS APPLY TO SOLDER DIP OR TIN PLATE LEADS.

N Package
14-Lead Plastic DIP



*THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.010 INCH (0.254mm).

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